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WONDER QUEST with April Holladay, A Weekly Column \* February 7, 2001\* Albuquerque

## Crackling power lines

**Q:** Why do high tension power lines sizzle and snap in damp weather? I've noticed this in a hard snowstorm.

**A:** High tension power lines sizzle and snap in damp weather because a phenomenon, called a "glow or corona discharge", forms around the conductors. You can hear the discharge clearly as a crackling sound and sometimes see a blue light. It's "a type of continuous electric spark," says William Beaty, an electrical engineer writing in Scientific American.

Corona discharge is an everyday phenomenon you're well familiar with. Copiers and laser printers, for example, contain a thin high-tension thread that charges the paper with corona. It's the same glow you see in fluorescent tubes and neon signs. Corona also develops around pine needles, masts, and lightning rods during thunderstorms. It's called St. Elmo's Fire when it occurs naturally.

"The voltage tears apart the air molecules and the gas begins to glow," says Beaty about St. Elmo's fire. "It takes about 30,000 volts per centimeter of space to start a St. Elmo's fire (although sharp points [intensify the electric field and] can trigger it at somewhat lower voltage levels.)"

High-voltage power lines carry 230,000 volts or more, which is enough, to cause an electrical discharge from the conductors under certain conditions.

"The presence of moisture in the air or on the conductor promotes electrical conduction and reduces the voltage required for corona onset to occur," says Richard Johnson, an electrical engineer at the Public Service Company of New Mexico. There is always a small amount of corona discharge going on, he says. "The presence of moisture simply magnifies the effect."

**Further Surfing:**

**St. Elmo's Fire by William Beaty, Scientific American**

**Figure Caption:** [Public Service Company of NM] Electrical transmission towers and high-voltage (345,000-volt) power lines near Albuquerque, New Mexico. The arrow points to the energized wires, which are likely places for corona discharge to occur.

